

OBSERVATIONS ON THE GREAT LAKES.

REPORTS FROM VESSELS.

The Lake Marine Section of the Forecast Division has received reports for November from the captains of 29 vessels navigating the Great Lakes. The following miscellaneous items are extracted from their reports.

Capt. R. E. Gain, s. s. "W. H. Sawyer," November 5, 11 p. m., at Milwaukee, bright aurora in northeast.

Capt. Geo. Holdridge, s. s. "A. D. Thompson," reports a shoal composed of large boulders not on the Lake Survey charts of Lake Huron, and located east-southeast of Detour light, distant 9 miles; Graveley Islet bore nearly northwest, and a double point on Drummond Island bore northeast-by-north, distant 2 miles; the shoal has 10 feet of water on it and is probably of small extent, there is a depth of 7 fathoms close by.

Capt. George Robertson, schooner "M. A. Lydon," on the 30th lay in the harbor of Charlotte, Lake Ontario, wind-bound on his way to Toronto, and says that this is the poorest port on the Lake at which to get weather information; recommends that greater conveniences be provided.

Capt. J. W. Morgan, s. s. "Australasia," November 1, while passing up the Saint Marys River, "auroras very bright and extending overhead, part of the time very red and then very faint, observed until 10.30 p. m."

Capt. Hugh O. Miller, s. s. "Conemaugh," desires the display of weather signals at Sand Beach rather than Point aux Barques, as his course takes him within 2 miles of the former, but 5 miles of the latter, otherwise he gets no weather signals between Port Huron and Thunder Bay Island.

Capt. C. W. Lockwood, s. s. "B. L. Pennington," at Toledo, on the 14th and 15th, the water in Lake Erie fell $3\frac{1}{2}$ feet during a strong westerly gale with frequent snow squalls.

Capt. John Lowe, s. s. "Kaliyuga," November 1, in the evening, at the northern end of Lake Michigan, observed the northern lights in the east and northeast.

Capt. Edward Mooney, s. s. "Wa-Wa-Tam," November 1, in the eastern portion of Lake Superior, at 5.45 p. m., northern lights; 6.15 p. m., very brilliant from east-northeast to northwest, very red in the northwest, which color lasted twenty minutes; the aurora lasted until 11 p. m.

REPORTS FROM U. S. LIFE-SAVING STATIONS.

Through the kind co-operation of the General Superintendent of the Life-Saving Service and the Secretary of the Treasury, the Weather Bureau has received 153 weekly transcripts of journals for the month of November from the

keepers of 39 U. S. Life-Saving stations on the Great Lakes. The following special notes by the respective keepers are extracted from these journals:

Ludington, Mich.—St. Peter, keeper. November 1, northern lights visible from 6 p. m. to midnight.

Vermillion Point, Lake Superior.—S. F. Bernier, keeper. October 31, robins and blackbirds are flying south.

Middle Island, Lake Huron.—Donald McKenzie, keeper. October 29, first snow of the season that lay for any length of time. November 1, a few claps of distant thunder about 8 a. m.; 8 p. m., rain showers; northern lights visible occasionally during the night and continued after midnight till the morning of the 2d.

Oswego, Lake Ontario.—F. W. Anderson, keeper. November 2, between 10 and 12 p. m., thunder squalls with rain and sharp lightning.

SURFACE CURRENTS AND FOG ON THE LAKES.

Mr. N. B. Conger, Inspector, in charge of the Lake Marine Section, in his monthly report for November states that out of 2,000 bottles that have been floated in the different lakes comparatively few have, thus far, been picked up and returned. Out of 800 floated in Lake Superior during this season only 34 have, as yet, been picked up. The general results of this work as to the movements of the water will soon be presented in a special bulletin by the Chief of the Bureau.

Thirteen stations for the display of storm signals have been established at places where they will be of great benefit to the navigators.

The total losses of vessels and lives on the lakes during this season have been 53 vessels and 123 lives; aggregate tonnage 24,258 and aggregate value \$1,040,400. Nearly half of this loss was on Lake Erie. The largest single loss has been the collision on Lake Huron of the steamers Philadelphia and Albany in the fog of November 7, 10 miles from the Life-Saving station. The cause of the great number of accidents has been the prevalence of fog, due to the vapor from the warm lake surface.

NOTES BY THE EDITOR.

CLIMATE OF TEXAS.

TREE GROWTH.

Col. William W. Haupt of Kyle, Hayes County, Tex. (N. $30^{\circ} 0'$, W. $97^{\circ} 50'$), communicates the results of measurements made in 1859 by Mr. J. Keuchler, of Gillespie County, Tex. (N. $30^{\circ} 20'$, W. $98^{\circ} 50'$), about 200 miles northwest from the Gulf coast at Indianola. These observations were originally published in the German language in a daily newspaper, the "Zeitung," of San Antonio, and if there be no serious misprints, the general value of the record will not be seriously injured.

Mr. Keuchler seems to have adopted the idea that a tree bears the history of its climatic surroundings written in itself, and that its annual rings of growth vary in size mainly with the supply of water to the roots, so that broad rings indicate wet years and thin rings that can scarcely be distinguished with the naked eye denote dry years. Great care was taken by Mr. Keuchler in the selection of trees for his measurements. He felled three post-oaks, two of which were over 130 years old; they were located upon a high isolated position so that the drought should have an early effect upon the trees, they were also sound and healthy trees. He cut a perpendicular section from each trunk near the thick end, planed its surface very smooth and then varnished it over, which made the annual ring distinctly visible. From each section he prepared a table of the relative order and position of the annual rings; upon comparing these three tables they were found to correspond exactly, thus confirming the idea that moisture is the principal cause of the difference in the breadth of the rings. Although some authors have observed in Texas two quite distinct periods of growth and repose within one year, one of them beginning with the spring and ending with the droughts of early summer the other beginning with the rains of early autumn and ending with the dry cold of winter, yet Mr. Keuchler thought it best to attribute his outermost ring to the growing season of 1858, and counted thence inward and backward, one ring for each year, obtaining the dates given in the next paragraph, which also shows the width of the respective rings, or rather his inference as to the character of the rainfall of each season.

1725-'27, very wet; 1728 and '29, dry; 1730, very wet; 1731 and '32,

dry; 1733-'38, wet; 1739-'41, dry; 1742-'57, very wet; 1758, average; 1759-'61, very dry; 1762 and '63, wet; 1764, very dry; 1765-'70, very wet; 1771-'76, extremely dry; 1777-'80, wet; 1781-'83, average; 1784-'87, wet; 1788-'90, dry; 1791, average; 1792 and '93, very wet; 1794, average; 1795-'98, very wet; 1799, very dry; 1800 and '01, very wet; 1802-'05, very wet; 1806-'11, extremely wet; 1812-'18, very wet; 1819, average; 1820, very dry; 1821-'24, very wet; 1825 and '26, average; 1827-'31, very wet; 1832, average; 1833 and '34, very dry; 1835, very wet; 1836, very wet; 1837, dry; 1838, average; 1839 and '40, very wet; 1841, dry; 1842, average; 1843 and '44, dry; 1845 and '46, very wet; 1847, dry; 1848, very wet; 1849 and '50, wet; 1851-'54, average; 1855-'58, dry.

This record of 134 years shows 6 extremely dry; 8 very dry; 19 dry; 17 average; 18 wet; 60 very wet; 6 extremely wet. The large number of very wet years, as given by Mr. Keuchler, is not at all in accord with the rainfall records during the years 1840 to 1890, and, in fact, no region on the globe is known where the distribution of the rainfall is similar to that given by these records. It is evident that the breadth of the annual rings of growth adopted by Keuchler as corresponding to dry and average and wet seasons needs considerable modification, there is no reason conceivable why the rings of average breadth should not be the most numerous, while those corresponding to the unusual extremes of dryness and wetness should be about equally numerous. The tree growth can not be adopted as an index of the rainfall alone unless it is proved by the biologist that rainfall alone affects the growth, which is well known to be far from true. The annual rings certainly depend at least in part upon the evaporation, the sunshine, the temperature, and the distribution of rain in frequent showers or in frequent heavy floods. It is the combination of several favorable meteorological circumstances that must have produced the large number of broad rings which Mr. Keuchler has attributed to 60 very wet years and 6 other extremely wet years. In fact it is best not to attempt to establish any fine details as to the climate from such a record of tree growth, but to content one's self with the general statement that there were 14 years during which the climate was unfavorable for the increase of woody fiber, 54 years during which there was an average favorability, and 66 years that produced large growth owing to very favorable conditions. As the